

manner with the *Scolecida*—since, although in the points above mentioned they display their affinities to the Echinoderms, still, as regards the structure and different modifications of the ventral excretory apparatus, they agree more closely with the *Trematoda* or flukes.

XV. “On the Development of Striated Muscular Fibre.” By WILSON Fox, M.D., Professor of Pathological Anatomy in University College, London. Communicated by Dr. SHARPEY. Received June 15, 1865.

(Abstract.)

The discrepancies in the statements made by various observers on the structure, as illustrated by the history of the development, of striated muscular fibre, have induced the author to submit the question to a renewed and independent investigation. He has examined the process in the tadpole, the chick, the sheep, and in man, and with results which correspond very closely in all these classes. The investigation is most easy in the tadpole, as the early structures are of much larger size; but observations are made with a comparatively greater precision when high magnifying powers are employed. The author has used 900 linear in his observations on the tadpole, 1250 or 1850 linear in his observations on the chick and mammalia. The earliest form in which muscular tissue appears in the tadpole is an oval body containing one or more nuclei, and densely filled with pigmentary matter. This body has a well-defined outline, which induces the author to regard it as a cell, though he has not succeeded in isolating any distinct membrane. Such bodies then increase in length with or without multiplication of their nuclei, and after a short period a portion of their structure loses in great part its pigment and exhibits a striation sometimes transverse, sometimes longitudinal, or occasionally both conjointly; but there is no distinct line of demarcation at this stage between the striated and non-striated portion of the cell-contents,—showing that the change takes place within the contents of the cell.

As the pigment gradually diminishes in the non-striated portion of the cell-contents, a membrane can in some cases be very distinctly observed limiting the whole structure, while in others it can only be seen around the non-striated portion, and in the former case the presence of a striated structure within this membrane is very distinct. The nuclei are always found situated in the granular non-striated portion of the contents of the cell.

The cell may elongate to a very long fibre, to which only a single nucleus may be attached, or in the process of elongation a great increase in the number of nuclei may take place. In all cases the nucleus and fibre are enclosed by a membrane, which the author regards as an extension of the original membrane enclosing the cell in its earlier stages. The thickness of the striated portion appears to be in direct proportion to the number of nuclei enclosed within the membrane.

With the advance of development the space occupied within the mem-

brane by the granular non-striated as compared with the striated portion of the fibre diminishes, so that the latter almost entirely fills the membrane, the nuclei lying within the membrane but external to the striated portion, and surrounded by a small amount of the granular matter of the original cell-contents.

The differentiation of the muscular fibre of the chick commences in the dorsal region, according to the author's observations, after about forty-eight hours of incubation. Here the first appearance is of nucleated oval bodies with well-defined outlines, but much smaller than in the tadpole, which the author regards as cells, though he has been unable to isolate a membrane. These rapidly elongate into fusiform bodies, in which sometimes a faint striation becomes apparent. Shortly after the commencement of the third day long fibres appear, apparently from the elongation of the former, which are striated both longitudinally and transversely, and upon them is situated a nucleus, around which is some granular matter (the remains of the original cell-contents), the whole being enclosed by a membrane.

From the fourth to the fifth day a great multiplication of the nuclei follows within the membrane, and in proportion to this multiplication does the diameter of the fibre, and also of the striated portion, increase.

The author has observed a similar process in the growing extremities of the sheep and of man, and concludes that the growth of muscular fibre commences in the cells of the embryo by the elongation of the cells and multiplication of their nuclei, attended by a simultaneous fibrillation and striation of their contents. He regards the sarcolemma as resulting from the extension of the wall of the parent cell, but thinks that the adult muscular fibre should not be regarded so much in the light of a single many-nucleated cell, as the result of the fusion of many cells in the act of formation, the separation of which, after the division of their nuclei, has been prevented by the early fibrillation of their contents,—a view which approximates somewhat to that held by Schwann, and which is also a modification of the opinion expressed by Kölliker and Remak.

The development of the muscular fibre of the heart in the chick commences, according to the author, after forty-eight hours of incubation, by the appearance of stellate cells, which anastomose with one another in all directions. The processes which these give off increase in thickness, and nuclei appear upon them, probably by multiplication of the nuclei of the original cells. Fibrillation and transverse striation of these processes appear from the third to the fourth day. The structure becomes so complex after this period, that the author has been unable to follow the development further. He has not been able to find any membrane resembling the sarcolemma upon these processes from the stellate cells, though with a power of 1250 linear they may often be seen to have a double outline. He thinks the presence of a sarcolemma may be inferred from the fact that the position of the nuclei in relation to the striated portion is the same as

in other striated muscle, and that its excessive tenuity is probably the cause of its escaping observation.

XVI. "Researches on the Structure, Physiology, and Development of *Antedon* (*Comatula*, Lamk.) *rosaceus*." By Dr. W. B. CARPENTER, F.R.S. Received June 15, 1865.

(Abstract).

The author, after adverting to the special interest attaching to the study of this typical form, as the only one readily accessible for the elucidation of the life-history of the CRINOIDEA, states it to be his object to give as complete an account as his prolonged study of it enables him to offer, of its minute structure, living actions, and developmental history, taking up the last at the point to which it has been brought in the memoir of Prof. Wyville Thomson.

He prefaces his memoir with an historical summary of the progress of our knowledge of the distinctive peculiarities of this genus, and of its relation to the Crinoidea; and he shows that the first recognition of this relationship was most distinctly made by Llhuyd, at the beginning of the last century, though that recognition has been passed without notice by most subsequent writers, and is altogether ignored by MM. de Koninck and le Hon in their recent history.

The author then proceeds to describe the external characters of *Antedon rosaceus*; and shows, from its habits as observed in a vivarium, that although possessed of locomotive power, it makes so little use of this under ordinary circumstances, that its life in the adult condition, no less than in its earlier stage, is essentially that of a pedunculate Crinoid.

He then gives a minute description of the several pieces of the skeleton—the accounts of these previously given by J. S. Miller and Prof. Joh. Müller not being in sufficient detail to serve as standards of comparison to which the parts of fossil Crinoids may be referred. And he directs special attention to the curiously inflected rosette-like plate, previously unnoticed, which occupies the central space left within the annulus formed by the adhesion of the first radials. This plate is in special relation to the organ termed by Joh. Müller the "heart," but certainly having no proper claim to that designation, being a quinquepartite cavity in the central axis, from the walls of which there pass out not vessels but solid cords of sarcode, into the rays and arms, and also into the dorsal cirri. The inflexions of the rosette-like plate serve for the support and protection of the large cords passing into the rays, each of which has a double origin, and a connexion with the adjacent radiating cords that reminds the anatomist of the "circle of Willis."

The skeleton of the adult differs so widely in the forms and relations of its parts from that of the early Pentacrinoid larva described by Prof. Wyville Thomson, that the derivation of the former from the latter can only be understood by observation of all the intermediate stages. When